June 18. A section will be devoted to scientific apparatus constructed by teachers and pupils. The Board, in including this section has in view the possibility that, by encouraging the construction of apparatus by its teachers and pupils, it may be possible to reduce the present heavy accounts for scientific apparatus and also that, at the same time, it may assist in familiarising the pupils with the practical use of apparatus. The sight of apparatus of a cheap and "home-made" character will be the means of encouraging the study of practical science at home.

ENCOURAGEMENT is being given to the study of natural history or nature-study in many districts. A programme has been sent to us of a series of Saturday afternoon rambles organised for the benefit of teachers by the Technical Instruction Committee of the Essex County Council. Conducted in the sympathetic spirit of the true student of animate nature, the excursions may be made a source of pleasure and profit to all who participate in them, but great care must be taken to prevent them from becoming expeditions of extermination. Prof. Miall points out this danger in a letter to the third number of the *Nature-Study Journal* published by the South-Eastern Agricultural College, Wye. The journal also contains short papers on uses of the balance, the metamorphosis of frogs, bees and flower shapes.

LORD ROSEBERY referred to the Education Bill in his address at Leeds on Friday last. He summed up the Bill by saying that "it discountenances efficiency in primary education, rewards inefficiency, starves secondary education, and ignores altogether the training of teachers." Education, he urged, is a national and Imperial duty, and its development should not be dependent upon local rates. The Bill provides that municipal authorities may apply the balance of the "whisky money," and may spend up to a twopenny rate in order to provide for the higher secondary and technical education so urgently needed in this country. This is not only inadequate in amount, but unsound in principle, and, remarked Lord Rosebery, "the putting of education on the rates is perhaps the surest method that the Government could have chosen for restraining the educational development of this country."

NEW regulations for secondary day schools have been issued by the Board of Education. The schools will be in two divisions—one containing what have hitherto been designated schools of science or organised science schools; and the other, secondary schools having courses in which science is given fair attention. The schools in Division A must provide a thorough and progressive course in science, together with the subjects of a general education. The obligatory subjects are mathematics, physics, chemistry, drawing and practical geometry; and not less than fifteen hours per week must be allotted to instruction in them, of which not more than five hours are to be given to mathematics. Practical work must be done in every science subject. On the completion of the elementary course, students may select physical, mechanical or biological courses, such as have been carried on for some time in schools of science. In Division B of secondary day schools, not less than nine hours a week must be given to science instruction in forms for which grants will be made. The instruction must be both theoretical and practical, and the laboratories must be suitably equipped for the subjects sanctioned.

THE executive committee of the National Association for the Promotion of Technical and Secondary Education adopted the following resolutions referring to the Government Education Bill at a meeting held on May 30:—(1) That this executive committee, while expressing no opinion on the more controversial aspects of the Education Bill relating to elementary education, regards it as essential to the interests of technical and secondary education, (*a*) that the fund available under the Local Taxation (Customs and Excise) Act, 1890, should be permanently appropriated by the Bill and devoted by the local authorities to the purposes of technical and secondary education; (*b*) that the areas of administrative control over technical and secondary education by local education authorities should, as provided by the Bill, continue to be the administrative counties and county boroughs or combinations of such areas. (2) The executive committee also considers it highly desirable, (*a*) that clauses 3 and 15 should be so amended as not to deprive any local authorities of the power they now possess to levy a penny rate for the purposes of technical and secondary education; (*b*) that the local authorities should be represented on the governing bodies of all institutions to which grants are made.

IT has already been announced that Mr. Alfred Mosely has arranged to send out to America two commissions of inquiry—one to study methods of education in their bearing on commercial and industrial efficiency, and the other industrial organisation and the problems of labour and capital. We learn from the *Times* that Mr. Mosely has just returned from the United States, where, in conjunction with President Butler, of Columbia University, he has settled the provisional itinerary of the educational commission. The exact date when this commission will start has not yet been decided. The programme arranged by President Butler seems to be of an exceedingly instructive and comprehensive character. Among the places to be visited are New York, with Columbia University, Auchmuty trade schools, the Educational Alliance, the University Settlement Society and the Normal College; New Haven, Conn., where Yale University will be inspected; Boston, with Harvard University and the Massachusetts Institute of Technology; Philadelphia, for the University, the Drexel Institute, the Manual Training Schools and the Commercial Museum; Baltimore, where the Johns Hopkins University and Hospital will be seen; Washington, for the Smithsonian Institution, National Museum and the Department of Agriculture; Pittsburgh, with the Carnegie Museum; Chicago, with the University, the School of Education, Prof. Dewey's University School and the Armour and Lewis Institutes; and Ithaca, N.Y., where Cornell University will be visited.

FOUR years ago an important gift was bestowed on the University of Paris, but it seems to have attracted little public attention. The Minister of War having decided to abandon three of the bastions constructed at the south frontier of the Parisian fortifications, generously placed them at the disposal of the University of Paris for the purpose of higher education. Each bastion represents about 3000 square metres of site. The council of the University determined to devote two of these to extending the facilities of the Faculty of Science and the third to the use of the Faculty of Medicine, and on these areas buildings suitable for the new installations required in connection with the above Faculties, which in the absence of a site cannot be erected in the centre of Paris, were to have been built. But though, with the intention of proceeding to erect the necessary buildings, the gift of the Minister of War was immediately accepted by the Faculties of Science and Medicine, funds voted for the purpose, and designs prepared by the architect of the Sorbonne, nothing has yet been done in the way of building. This delay is, it appears, the result of numerous objections which have been raised in different quarters. In a recent number of the *Revue générale des Sciences* these objections are answered in detail, and it is shown that it would be a great pity from the point of view of facilities for scientific research if the unhoped for chance of fine large laboratories on the outskirts of Paris was, even provisionally, abandoned.

SOCIETIES AND ACADEMIES.

CAMBRIDGE.

Philosophical Society, May 5.—Dr. J. Larmor, vice-president, in the chair.—Regeneration in *Samia ailanthus*, by Mr. H. H. Brindley. With the object of ascertaining the degree of regeneration and how far it is uniform in the imago after injury to the larva in particular stadia and to particular extents, amputation experiments were made on the legs of this moth in larva. Owing to the large number of cases in which the imago did not emerge the results were somewhat limited, but sufficient instances were observed to suggest (*a*) that compared with Orthoptera and other non-pupating forms the results of injury are very variable, (*b*) that the earlier the instar injured the imaginal limb more closely approaches the normal in form and size, (*c*) there is no uniformity in the presence of the terminal claw apparatus without regard to the number of limb joints such as has been observed in Arachnids, Myriapods and several orders of non-pupating insects, and (*d*) that the length of time spent in pupa and the degree of injury to the larval limb seem not to influence the degree of regeneration. As regards (*b*) the results are in general accord with those of Newport on Vanessa and Chapman on Liparis, though not as regards (*c*) with Newport. The experimental evidence obtained also seems to confirm Gonin's opinion, based on anatomical grounds, that the imaginal limb is a distinct structure from the larval limb during the instar preceding pupation.—On the unit of classification for systematic biology, a reply to Mr. Bernard, by Mr. J. Stanley Gardiner.—Remarks on Marconi's system of telegraphy, by Mr. H. M. Macdonald.—On trinodal quartics, by Mr. A. B. Basset.—On a definite integral, by Mr. T. J. I'A. Bromwich.—Reflection and transmission of light by a charged metal surface, by Mr. P. V. Bevan.—Note on a general numerical connection between the atomic weights, by Mr. C. A. Vincent. If a list of all the atomic weights in ascending order of magnitude be taken and the order in this list be called n, then the nth atomic weight, from $n=3$ to $n=60$, is given by the equation

$$W=(n+2)^{1\cdot21}.$$

If the atomic weights are from Clarke's 1901 list with hydrogen as unit, then the greatest difference between the computed and determined value will not exceed 4 units, nor will the error ever be greater than 5 per cent.; in thirty-six cases the result will not be a unit wrong and in twenty cases will not be 1 per cent. wrong; the mean error for the whole fifty-eight elements considered is about 1·005, the mean percentage error about 1·6. By replacing $n+2$ of the above formula by N, and taking N as indicating the order in an augmented list of the elements, the formula may be made to embrace the whole of the seventy-seven elements now definitely known. This necessitates predicting an element between hydrogen and helium and one between helium and lithium. No other gaps are left until after samarium, when in order to complete the list it is necessary to assume elements in various places, making fifteen gaps in all. The thirteen gaps introduced after samarium are in general accord with those predicted by the periodic table.—On radioactive rain, by Mr. C. T. R. Wilson. As the experiments of Elster and Geitel and of Rutherford have shown, a negatively charged body exposed in the atmosphere becomes radioactive, apparently showing the presence of some radioactive substance in the atmosphere; it occurred to the author to test whether any of this radioactive substance is carried down in rain. Freshly fallen rain-water (less than 50 c.c. was generally used) was found when evaporated to dryness to leave behind a radioactive residue. The radioactivity was detected by means of the increase in the ionisation of the air within a small vessel, of which the top, or, in other experiments, the bottom, was of thin aluminium or of gold-leaf, the other walls being of brass. The metal surface on which the rain had been evaporated was placed close up to the aluminium or gold-leaf, and the rate of movement of a small gold-leaf which served to measure the ionisation was observed (v. *Roy. Soc. Proc.*, vol. lxviii. p. 151). In many cases the radioactivity obtained from the rain was sufficient to increase the ionisation five- or six-fold. From the evaporation of distilled water, of tap-water or of rain-water which had stood for many hours no radioactivity was obtained. Like the induced radioactivity obtained on a negatively charged body, that derived from rain gradually dies away, falling to about half its initial value in the course of an hour.—On the increase in the electrical conductivity of air produced by its passage through water, by Prof. J. J. Thomson. In continuation of the experiments brought before the Society last term, the author investigated the effect produced on the conductivity of air by bubbling it through water. The air from a large gas-holder of about 350 litres capacity was bubbled vigorously through water by making the air in the vessel circulate through a water-pump; this treatment increased the conductivity of the air, and when the bubbling had been going on for some time the conductivity of the air was ten or twelve times the initial conductivity. When once the air has been put in this highly conducting state it stays in it for a very considerable time; a large part of the conductivity produced by the bubbling remains in the air forty-eight hours after the bubbling has ceased, nor does it disappear when an intense electric force is kept applied to the gas. The effect produced by the passage of the air through water is similar to that which would be produced if the bubbling produced a radioactive "emanation" similar in properties to those emitted by thorium and radium. The conducting gas can be passed from one vessel to another; it retains its conductivity after passing through a porous plug; passage through a long tube heated to redness destroys the conductivity; it takes, however, a very high temperature to do this, temperatures less than 300° or 400° C. seem to produce comparatively little effect; if the gas is passed very slowly through a long tube filled with beads moistened with sulphuric acid, the conductivity is destroyed; unless, however, the stream of gas is very slow, the air retains a good part of its conductivity in spite of the sulphuric acid. Another point of resemblance between the "emanation" from radioactive substances and a gas in this state is that if a strongly negatively electrified conductor be kept in the gas for some time, the conductor becomes radioactive.

Dublin.

Royal Irish Academy, May 26.—Dr. R. Atkinson, president, in the chair.—Prof. Grenville A. J. Cole read a paper on Composite Gneisses in Boylagh, West Donegal, in which he urged that the essential features of the foliation in the gneissoid granite from Ardara to Finntown were due to conditions of original flow, and not to subsequent dynamometamorphism. He attributed the darkened types of granite, with a specific gravity of about 2·74, to admixture of the pure aplitic intrusive rock (specific gravity about 2·59) and the already foliated schists. The foliation in the granite is commonly accompanied by numerous residual flecks of schist, and larger elongated inclusions occur which have retained the strike of the masses of which they once formed a part. Subsequent shearing has here and there produced mylonitic structures, but the granite was converted into a gneiss by its mode of intrusion, under mountain-building pressures, along the planes of separation of an altered sedimentary series. The gneisses of Boylagh are thus almost all of composite origin, and the foliated masses and limestone bands lying in the central granite of Donegal, and running with so persistent a N.E. and S.W. strike, represent the undissolved residue of an anticlinal mass composed originally of numerous parallel folds. The trend of these folds and of the granite axis points to their establishment in the Caledonian epoch of mountain-building. The later pegmatitic veins which cut them, and which are not affected by the folding, may, then, be of Devonian age.

Paris.

Academy of Sciences, May 26.—M. Bouquet de la Grye in the chair.—The motor muscle employed in the production of positive work. The comparison with inanimate motors, from the point of view of the dissociation of the several constitutive elements of the energy expenditure, by M. A. Chauveau.—On the ethology of the larva of *Sciara medullaris*, by M. Alfred Giard. The biological history of the larvæ of Sciara is dominated and directed by the conditions of the humidity of the medium in which the organism is placed.—The synthesis of petroleum: contribution to the theory of formation of natural petroleum, by MM. Paul Sabatier and J. B. Senderens (p. 138).—On the rays of convergence of a double series, by M. Eugène Fabry.—On the general exponential representation and some of its applications, by M. L. Desaint.—On functions of complex variables, by M. D. Pompéiu.—The receiver in wireless telegraphy, by M. Édouard Branley. The receiver in common use in wireless telegraphy has a radioconductor containing a fine metallic powder. Owing to the numerous contacts, these tubes are sometimes a little variable in their behaviour, and in attempting to increase the regularity of working the author has recognised that a radioconductor of the type oxidised metal-polished metal is the best, as it not only possesses the required regularity of working, but is more sensitive than the ordinary type. A description and figure of the instrument that has been found to give the best results is given.—On the electric discharge in flames, by M. Jules Semenov. In electric discharge in flames it was found that the negative pole heats much more than the positive pole, the negative pole being the seat of a phenomenon of a reflux of material particles the direction of which appears to be independent of the relative position of the two poles.—On the temperature of the electric arc, by M. Ch. Féry. The optical pyrometer of Chatelier was modified by the introduction of a thin prism of absorbent glass for the production of the photometric equilibrium. The temperatures thus observed with prisms of red and green glass were compared directly with the readings of a platinum-rhodium platinum couple, the results being in very close agreement up to 1500° C., the highest temperature attainable with the couple. Within these limits the law of Wien was found to be verified, and these results were then extended to the case of the temperature of the electric arc. The value found, 3882° C., differs considerably from the value found by Chatelier, 4100° C., from which the conclusion is drawn that carbon does not behave at its boiling point as a perfectly black substance.—Fields of force of bipolar diffusion, by M. S. Leduc.—On the modifications brought about by self-induction in some dissociation spectra, by M. A. de Gramont. A continuation of previous researches on the same subject. The changes in the spectra brought about by changes in the self-induction of the spark circuit are studied in the cases of arsenic, antimony, graphite, silicon, germanium and thallium.—The employment of urine in the development of the photographic plate, by M. R. A. Reiss. Urine has a slight reducing action upon the photographic plate and may replace water in the developing solutions.—On the temperature of maximum density and the electric conductivity of some solutions of barium bromide and iodide, and calcium chloride, bromide and iodide, by MM. L. V. de Coppet and W. Muller.—On some physical properties of hydrogen telluride, by MM. de Forcrand and Fonzes-Diacon. A mixture of hydrogen and hydrogen telluride was prepared by the action of acids upon aluminium telluride, and this mixture passed through tubes cooled to − 55° C. Pure hydrogen telluride separated out in the solid state, allowing of correct determinations of its melting and boiling points and molecular volume.—The preparation and properties of the chloro-, bromo- and iodo-sulphobismuthites of copper, by M. Fernand Ducatte.—On the alkaline cobaltioxalates, by M. Copaux.—On the constitution of the ammoniacal copper salts, by M. Bouzat. From a study of the amounts of heat developed in the reaction between solutions of ammonia and copper salts the author concludes that the ammoniacal compounds of copper ought to be considered as salts of complex bases.—On *p* : *p*-dinitrohydrazobenzene, by MM. P. Freundler and L. Beranger.—On the thiosulphocarbamic esters derived from primary amines, by M. Marcel Delépine.—The electrical resistance of metallic sulphides, by M. J. Guinchant. The resistance of the sulphides of iron, tin and lead was measured at varying temperatures. The resistance was generally a linear function of the temperature up to 100° C. The resistance of lead sulphide increased with the temperature, that of the sulphides of tin and iron decreased. The sign of the temperature coefficient would appear to depend upon the magnitude of the specific resistance, or of the causes which determine it, and not upon accessory phenomena, such as electrolysis, which accompany the passage of the current. The differentiation of solids into electrolytes and non-electrolytes according to the sign of this coefficient would thus appear to be unjustifiable.—The synthesis of aldehydes of the fatty series with the aid of nitromethane, by MM. L. Bouveault and A. Wahl (see p. 137).—The mechanism of the chemical variations in the plant when under the influence of sodium nitrate, by MM. E. Charabot and A. Hébert. Sodium nitrate behaves like the chloride in favouring esterification and reducing the percentage of water.—The composition and volumetric estimation of sodium methylarsenate, by MM. Adrian and Trillat.—Growth and auto-intoxication, by M. Frederic Houssay.—On the formation of the egg, maturation and fertilisation of the oocyte in *Distomum hepaticum*, by M. L. F. Henneguy.—On a new gigantic Pyrosome, by MM. Jules Bonnier and Charles Perez.—The modes of action and nature of the secretions of a pathogenic microbe, by MM. Charrin and Guillemonat.—Contribution to the study of life in seeds, by M. L. Maquenne.—The volcanic rocks of Martinique, by M. A. Lacroix.—The biochemical action of extract of kidney on certain organic compounds, by M. E. Gérard. The aqueous extract of the kidney of the horse, from which all cellular elements have been removed, is capable of hydrolysing glycogen, guaiacol, oxaluric acid and lactose.—On a comparison of the action of cold and anæsthetics on nutrition and reproduction, by M. Raphael Dubois.—The disease of young dogs. Statistics of the vaccinations practised from May 15, 1901, to May 15, 1902, by M. C. Phisalix.—On the existence of lipase in the blood, by MM. Maurice Doyon and Albert Morel.—Experimental researches on the action of compression on the respiratory exchanges in man, by M. J. Tissot.

DIARY OF SOCIETIES.

THURSDAY, June 5.

Royal Society, at 4.—Election of Fellows.—At 4.30.—On the Movements of the Flame in the Explosion of Gases: Prof. H. B. Dixon, F R.S.—Contributions to the Study of Flicker. Paper II.: T. C. Porter.—Effects of Strain on the Crystalline Structure of Lead: J. C. W. Humfrey.—The Spectra of Potassium, Rubidium, and Cæsium, and their Mutual Relations: H. Ramage.—On Some Definite Integrals and a New Method of reducing a Function of Spherical Co-ordinates to a Series of Spherical Harmonics: Prof. A. Schuster.

Chemical Society, at 8.—The Action of Ungerminated Barley Diastase on Starch. Part I.: J. L. Baker.—The Decomposition of Chlorates. Part V. Potassium Chlorate in presence of Oxides of Manganese: W. H. Sodeau.

Röntgen Society, at 8.30.—The Sources of Phosphorescence: Herbert Jackson.

Linnean Society, at 8.—On certain Species of Dischidia and their Double Pitchers: H. H. W. Pearson.—(1) On "Silver-leaf" Disease of Plums; (2) Observation on the Occurrence of Crystals of Calcium Oxalate in Seedlings of Alsike (*Trifolium hybridum*, Linn.): Prof. J. Percival.—On the Morphology of the Cerebral Commissures in the Vertebrata: Dr. Elliot Smith.

FRIDAY, June 6.

Royal Institution, at 9.—The Nile Reservoir and Dams: Sir Benjamin Baker, K.C.M.G., F.R.S.

Geologists' Association, at 8.—On a Peculiarity in the Course of Certain Streams in the London and Hampshire Basins: H. J. Osborne White.—Note on the Occurrence of *Microtus intermedius* in the Pleistocene Deposits of the Thames Valley: M. A. C. Hinton and G. White.

MONDAY, June 9.

Royal Geographical Society, at 8.30.—From the Somali Coast through Southern Abyssinia to the Sudan: Oskar Neumann.

TUESDAY, June 10.

Mineralogical Society, at 8.—On Meigen's Method of Discriminating Calcite and Aragonite: Dr. Hutchinson.—(1) On Krennerite; (2) On the Gnomonic Projection: H. Smith.—On Volcanic Dust which fell at Barbados: G. T. Prior.—*Exhibit*: A new form of Three-Circle Goniometer: H. Smith.

WEDNESDAY, June 11.

Geological Society, at 8.—A Descriptive Outline of the Plutonic Complex of Central Anglesey: Dr. Charles Callaway.—Alpine Valleys in Relation to Glaciers: Prof. T. G. Bonney, F.R.S.—On the Origin of some Hanging Valleys in the Alps and Himalaya, and their Bearing on the Question of the Relative Erosive Power of Ice and Water.—Prof. E. J. Garwood.

THURSDAY, June 12.

Royal Society, at 4.30.—*Probable papers*:—(1) The Influence of an Atmosphere of Oxygen on the Respiratory Exchange. (2) The Influence of High Pressures of Oxygen on the Circulation of the Blood: L. Hill, F.R.S., and J. J. R. Macleod.—On the Parasitism of *Pseudomonas destructans* (Potter): Prof. M. C. Potter.—On the Toxic Properties of the Saliva of certain "Non-Poisonous" Colubrines: Prof. A. Alcock, F.R.S., and Dr. L. Rogers.—The Dissipation of Energy by Electric Currents induced in an Iron Cylinder when Rotated in a Magnetic Field: Prof. E. Wilson.

Mathematical Society, at 5.30.—Sur un théorème fondamental dans la théorie des équations différentielles: M. E. Picard.—Some Arithmetical Theorems: Mr. G. H. Hardy.—The Principle of Huygens in a Uniaxal Crystal: Prof. A. W. Conway.

FRIDAY, June 13.

Royal Institution, at 9.—The Progress of Electric Space Telegraphy: G. Marconi.

Physical Society (National Physical Laboratory), 3.30–0.

Royal Astronomical Society, at 5.

Malacological Society, at 8.

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